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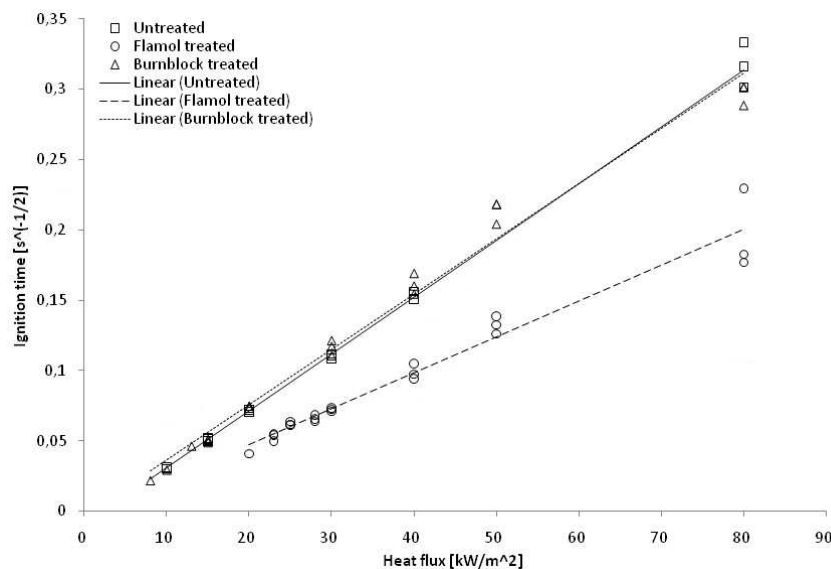
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Experimental Study of the Effects of Flame Retardants Applied to Chipboard

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Two different flame retardants used in Denmark, namely Flamol A and Burnblock, were tested on horizontally oriented chipboard in the cone calorimeter to assess their performance. The samples were exposed to radiant heat fluxes between 8 and 80 kW/m² to investigate the time to ignition, gas emissions, and the energy release rates. As occupant safety is the primary fire safety goal in structural environment, the criteria for success were not only the flame retardants' ability to suppress the flames or delay ignition of the fire, but also the flame retardants' influence on the production of smoke and toxic products.



A comparison of the results for the time to ignition showed that the Burnblock treated samples ignited as easily as untreated chipboard samples. Specifically, the Burnblock increased the time to ignition at a heat flux of 10 kW/m², whereas the ignition time declined for higher heat fluxes, indicating that the Burnblock had a negative effect. The results from the Flamol treated samples proved Flamol to be an effective flame retardant with respect to radiative ignition, as the samples had both a higher critical heat flux and an increased ignition time for all applied fluxes as shown in the figure.

The results from the gas analysis showed that the flame retardants in general increased the emission of carbon monoxide. It was also showed that the higher the incident heat flux the higher the emission of carbon monoxide. The flame retarded chipboards emitted less carbon dioxide than the untreated samples, but they also consumed less oxygen. The oxygen consumption method was used to show that the flame retardants somewhat reduced the heat release rate.

Based on the results it was concluded that there was a significant difference in the impact of the flame retardants. The Flamol A treated samples showed improvements on both time to ignition and heat release rate.

Keywords: Cone calorimeter, flame retardants, time to ignition, gas emissions, heat release rate, chipboard.

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